

WHAT IS CLAIMED IS:

1. A video display apparatus comprising:  
an optical source unit for radiating light;  
5 a polarization converter for matching light, which is  
outputted by said light source unit, to one of S polarizing light  
and P polarizing light;  
an optical characteristics switching element for  
electrically and periodically switching a wavelength band of  
10 light outputted by said polarization converter;  
a video display element, as light valve element, for forming  
an optical image from the light outputted by said light source  
unit, in accordance with a video signal;  
a radiating device for radiating light to said video display  
15 element; and  
a projector for projecting light outputted by said video  
display element,  
wherein the light outputted by said video display element  
is incident on said projector.

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2. An apparatus according to Claim 1, further comprising:  
a light path changing element,  
wherein said projector comprises a polarizing beam  
splitter, said video display element comprises a reflection-type  
25 video display element, and a light path from said light source

unit to said projector is U-shaped.

3. An apparatus according to Claim 1, wherein said optical characteristics switching element controls light diffraction by a voltage and is arranged on said light path, said radiating device comprises a polarizing beam splitter, and said video display element comprises a reflection-type video display element.

4. A projection-type video display apparatus comprising:  
a light source unit for radiating light;  
a polarizing beam splitter for matching light, which is outputted by said light source unit, to one of S polarizing light and P polarizing light;

an optical characteristics switching element for electrically and periodically switching a wavelength band of light outputted by said polarizing beam splitter;

a total reflection prism;

a reflection-type micromirror video display element for forming an optical image from light outputted by said light source unit, in accordance with a video signal; and

a projecting lens,

wherein a plurality of color light, which are sequentially outputted by said optical characteristics switching element, are reflected to said total reflection prism, they are incident

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on said reflection-type micromirror video display element, and ON-light is transmitted through said total reflection prism from the reflected light and is incident on said projecting lens.

- 5           5. A video display apparatus comprising:
- a light source unit for radiating light;
- a polarization converter for matching light, which is outputted by said light source unit, to one of S polarizing light and P polarizing light;
- 10           an optical characteristics switching element for electrically and periodically switching a wavelength band of light outputted by said polarization converter;
- a video display element, as light valve element, for forming an optical image from light outputted by said light source unit, in accordance with a video signal;
- 15           an image forming optical system comprising a plurality of lenses; and
- a projector for projecting light outputted by said video display element,
- 20           wherein a plurality of color light, which are outputted by said optical characteristics switching element, are radiated to said video display element through said image forming optical system, said image forming optical system forms an image of said optical characteristics switching element, the light outputted
- 25           by said video display element is incident on said projector.

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6. An apparatus according to Claim 5, wherein said optical characteristics element simultaneously outputs a plurality of color light and radiates them at different areas of said video display element, said plurality of color light sequentially move at said different areas.

7. An apparatus according to Claim 5, wherein said optical characteristics switching element, as a reflection-type optical characteristics switching element, comprises a total reflection prism, a video display element, as light valve element, for forming an optical image from light outputted by said light source unit, in accordance with a video signal, an image forming optical system comprising a plurality of lenses, and said projector for projecting light outputted by said video display element, and

light outputted by said polarization converter is reflected to said total reflection prism and is incident on said reflection-type optical characteristics switching element, the reflected light is transmitted through said video display element via said image forming optical system, and the light outputted by said video display element is incident on said projector.

8. An apparatus according to Claim 5, wherein said image forming optical system includes an aspherical lens.

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9. A video display apparatus, comprising:

a light source unit for radiating light;

a polarization converter for matching light, which is  
outputted by said light source unit, to one of S polarizing light  
5 and P polarizing light;

an optical characteristics switching element for  
separating light, which is outputted by said polarizing converter,  
into a plurality of light, for condensing the plurality of light  
at different positions, and for sequentially moving the plurality  
10 of light at the condensed positions; and

a video display element, as light valve element, for forming  
an optical image from light outputted by said light source unit,  
in accordance with a video signal; and

wherein said plurality of color light outputted by said  
15 optical characteristics switching element are radiated at  
different areas of said video display element, and said plurality  
of color light sequentially move at said different areas.

10. An apparatus according to Claim 9, further comprising:

20 an image forming optical system,

wherein said optical characteristics switching element  
comprises a hologram-type optical characteristics switching  
element using diffracted light, and said plurality of color  
lights are condensed at different positions of said image forming  
25 optical system.

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11. An apparatus according to Claim 9, wherein said optical characteristics switching element comprises a plurality of reflection-type optical characteristics switching elements, said apparatus further comprises an image forming optical system for forming an image of light outputted by said reflection-type optical characteristics switching elements to said video display element, different light outputted by said plurality of reflection-type optical characteristics switching elements are condensed at different positions of an image forming lens, a plurality of color light outputted by said plurality of optical characteristics switching elements are sequentially switched, said plurality of color light outputted by said plurality of reflection-type optical characteristics switching elements are radiated at different areas of said video display element.

12. A video display apparatus, comprising:

a light source unit for radiating light;

a first polarizing beam splitter for matching light, which is outputted by said light source unit, to one of S polarizing light and P polarizing light;

a first optical characteristics switching element of a transmission-type, for sequentially outputting a plurality of light from light outputted by said first polarizing beam

splitter;

a second polarizing beam splitter for reflecting first light of one of the P polarizing light and the S polarizing light outputted by said first optical characteristics switching element and for transmitting second and third light having the other polarizing light;

a second optical characteristics switching element for converting a polarizing axis of said second light;

a third polarizing beam splitter for reflecting said second light of the light outputted by said second optical characteristics switching element and for transmitting said third light;

a reflecting mirror for reflecting said third light which is transmitted through said third polarizing beam splitter;

a video display element, as light valve element, for forming an optical image from light outputted by said light source unit, in accordance with a video signal; and

an image forming optical system,

wherein said first light reflected to said second polarizing beam splitter, said second light reflected to said third polarizing beam splitter, and said third light reflected to said reflecting mirror are radiated at different positions of an image forming lens.

13. A video display apparatus, comprising:

a light source unit for radiating light;

a polarization converter for matching light, which is outputted by said light source unit, to one of S polarizing light and P polarizing light;

an optical characteristics switching element for electrically and periodically switching a wavelength band of light outputted by said polarization converter and for sequentially outputting a plurality of light;

a video display element which requires a response time for forming an optical image from light outputted by said light source unit in accordance with a video signal; and

a drive circuit for sequentially writing a video signal corresponding to color light outputted by said optical characteristics switching element to said video display element in the vertical direction every line,

wherein said optical characteristics switching element sequentially radiates said color light outputted by said optical characteristics switching element to said line, when said video signal is written to said video display element and the response time of said video display element passes.

14. A projection-type video display apparatus, comprising:

a light source unit for radiating light;

a video display element which requires a response time for forming an optical image from light outputted by said light

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source unit, in accordance with a video signal;

an optical characteristics switching element for  
separating light from said light source unit into a plurality  
of color light, radiating the plurality of color light at  
5 different areas of said video display element, sequentially  
moving said plurality of color light, and radiating said  
plurality of color light to said video display element; and

a drive circuit for sequentially writing the video signal  
corresponding to the plurality of color light outputted by said  
10 optical characteristics switching element to said video display  
element in the vertical direction every line,

wherein said optical characteristics switching element  
radiates said plurality of color light outputted by said optical  
characteristics switching element to said line, when said video  
15 signals of said plurality of color lights are written to different  
areas of said video display element and the response time of  
said video display element passes.

15. A video display apparatus, comprising:

20 an optical characteristics switching element for  
sequentially switching optical characteristics of a plurality  
of color light and outputting them;

a video display element having a response time thereof,  
on which the plurality of color light from said optical  
25 characteristics switching element are sequentially radiated;

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and

a drive circuit for alternately aligning the plurality of color light which are outputted by said optical characteristics switching element and complementary color light between the color light of adjacent waveform bands in said plurality of color light, and for writing a video signal corresponding to said color light and said complementary color light to said video display element,

wherein the color light outputted by said optical characteristics switching element is further radiated at a portion at which said complementary color light on both sides are written.

16. A video display apparatus, comprising:

an optical characteristics switching element for sequentially optical characteristics of a plurality of color light and outputting them;

a video display element requiring a response time, to which color light from said optical characteristics switching element is sequentially radiated; and

a drive circuit for sequentially writing a video signal corresponding to the color light outputted by said optical characteristics switching element, to said video display element in the vertical direction every line,

wherein in the case in which said color light outputted

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by said optical characteristics switching element is sequentially radiated to said video display element every said line when said video signal is written to said video display element and said response time passes, said drive circuit reduces  
5 said response time by setting a signal just before writing said video signal to be one of black and white signals and by setting a signal when said response time passes to be another signal thereof.

10 17. A video display apparatus wherein when radiating, to a video display element, light outputted by an optical characteristics switching element for sequentially switching and outputting optical characteristics of a plurality of color light, the plurality of color lights are sequentially outputted  
15 by said optical characteristics switching element, the plurality of color lights are sequentially outputted by said optical characteristics switching element by adding white light to the plurality of color light, radiating times of the plurality of color lights are changed, any of the plurality of color light  
20 is separately radiated at two steps, complementary color light is inserted among the plurality of color light, or only the white light is used.

18. A video display apparatus comprising:

25 a light source unit for radiating light;

a polarization converter for matching light, which is  
outputted by said light source unit, to one of S polarizing light  
and P polarizing light;

an optical characteristics switching element for  
5 electrically and periodically switching a wavelength band of  
light outputted by said polarization converter;

a videodisplay element, as light valve element, for forming  
an optical image from light outputted by said light source unit,  
in accordance with a video signal;

10 a radiating device for radiating light to said videodisplay  
element; and

a projector for projecting light outputted by said video  
display element,

wherein an arrangement of light outputted by said optical  
5 characteristics switching element is any of a time-serial  
arrangement of light of two or more colors, that of R-, G-, and  
B-light, that of R-, G-, B-, and W-light, that of cyan light,  
yellow light, and magenta light, that of the cyan light, the  
yellow light, the magenta light, and the white light, and that  
20 of a plurality of color light, said optical characteristics  
switching element freely controls output times including a  
similar time of the plurality of color light and different times  
thereof.

25 19. An optical unit, comprising:

a light source unit for radiating light;  
a polarization converter for matching light, which is  
outputted by said light source unit, to one of S polarizing light  
and P polarizing light;

5 an optical characteristics switching element for  
electrically and periodically switching a wavelength band of  
the light outputted by said polarization converter;

a video display element, as light valve element, for forming  
an optical image from light outputted by said light source unit,  
10 in accordance with a video signal;

a radiating device for radiating a plurality of color light,  
which are sequentially outputted by said optical characteristics  
switching element, to said video display element; and

a projecting lens,

15 wherein the light outputted by said video display element  
is incident on said projecting lens.

20. A color switching method in a video display apparatus,  
comprising the steps of:

20 matching light, which is outputted by a light source unit,  
to one of S polarizing light and P polarizing light;

electrically and periodically switching a wavelength band  
of the light whose polarizing direction is matched and for  
sequentially outputting a plurality of light;

25 sequentially writing a video signal corresponding to one

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of said plurality of light to a video display element in the vertical direction every line; and

radiating said one light to said line when said video signal is written and a response time passes.

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